

# State Drought Planning Basics and Case Studies



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**University of Nebraska-Lincoln**



# National Drought Mitigation Center

- **Founded in 1995 at the University of Nebraska-Lincoln**
- **16 staff members**

***Mission:* To lessen societal vulnerability to drought by promoting planning and the adoption of appropriate risk management techniques.**

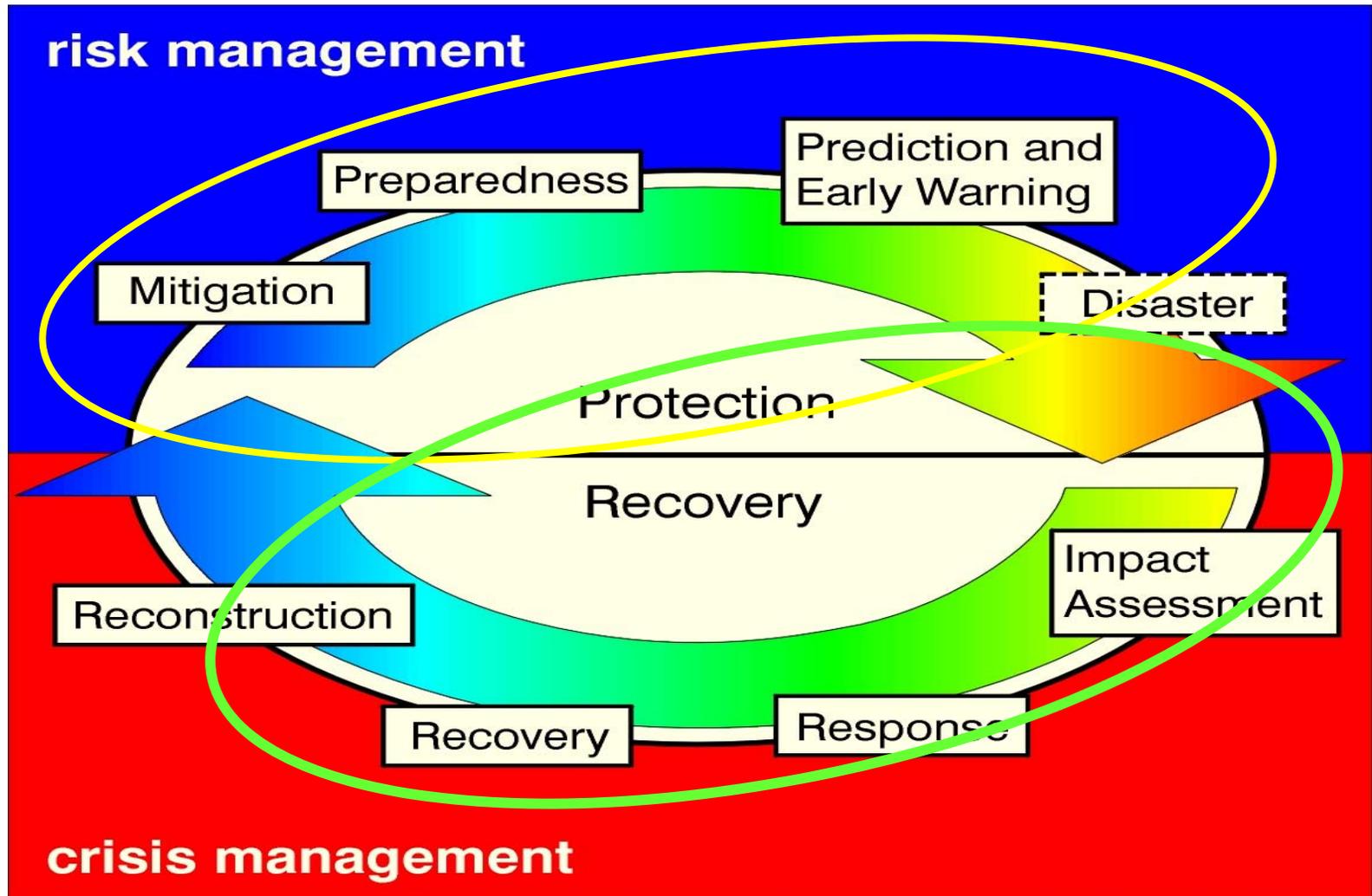


**Drought planning** is defined as actions taken by individual citizens, industry, government, and others before drought occurs to reduce or mitigate impacts and conflicts arising from drought. It can take two forms:

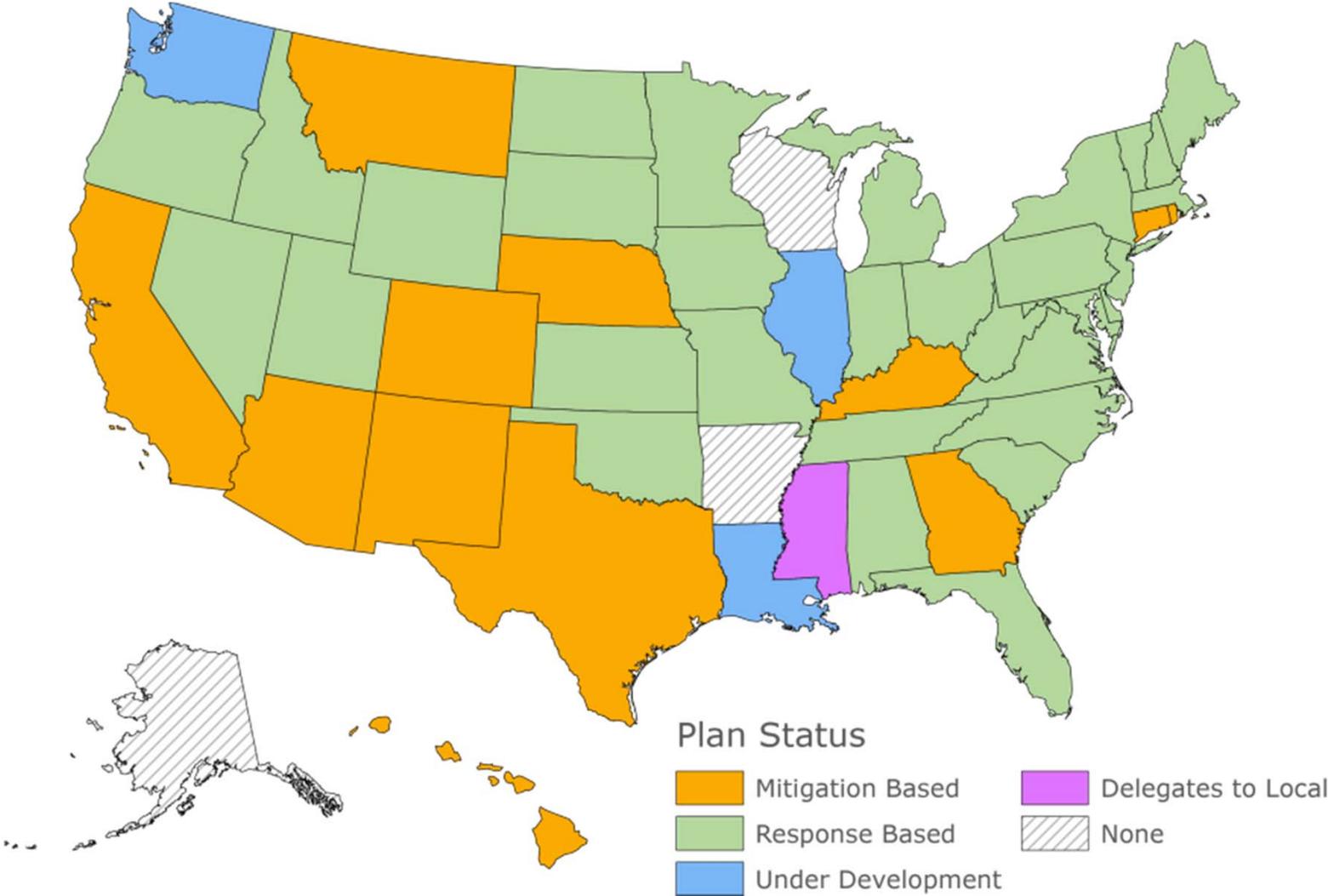
**Response** planning

**Mitigation** planning.

# The Cycle of Disaster Management



# Status of State Drought Planning in the U.S.

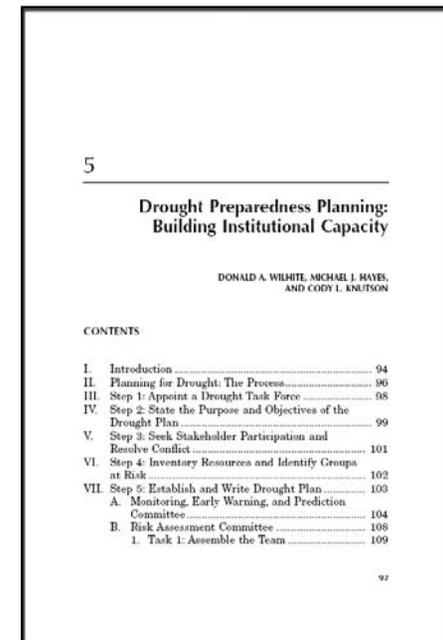


# NDMC 10-Step Drought Planning Process

## 10 Steps for Drought Planning

- 1 Appoint a Drought Task Force
- 2 State the Purpose and Objectives of the Drought Plan
- 3 Seek Stakeholder Participation and Resolve Conflict
- 4 Inventory Resources and Identify Groups at Risk
- 5 Develop Organizational Structure and Prepare Drought Plan
- 6 Integrate Science and Policy, Close Institutional Gaps
- 7 Publicize the Proposed Plan, Solicit Reaction
- 8 Implement the Plan
- 9 Develop Education Programs
- 10 Post-Drought Evaluation

- Created in 1990
- Revised in 2005
- Increased emphasis on drought mitigation



5

**Drought Preparedness Planning:  
Building Institutional Capacity**

DONALD A. WILHITE, MICHAEL J. HAYES,  
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CONTENTS

I. Introduction .....	94
II. Planning for Drought: The Process .....	96
III. Step 1: Appoint a Drought Task Force .....	98
IV. Step 2: State the Purpose and Objectives of the Drought Plan .....	99
V. Step 3: Seek Stakeholder Participation and Resolve Conflict .....	101
VI. Step 4: Inventory Resources and Identify Groups at Risk .....	102
VII. Step 5: Establish and Write Drought Plan .....	103
A. Monitoring, Early Warning, and Prediction Committee .....	104
B. Risk Assessment Committee .....	108
1. Task 1: Assemble the Team .....	109

92

URL: <http://www.drought.unl.edu/Planning/PlanningProcesses.aspx>



# State Drought Planning Context

**Drought planning undertaken within a broad range of contexts**

- **Legislation or agency mandate**
- **Stakeholder-driven (grassroots)**
- **Substantial political support and funding**
- **In-kind support with little political backing or implementation authority**
- **Covering a few or broad range of sectors (e.g. agriculture, water, fire, energy, etc.)**
- **Short time-frame or multi-year effort**



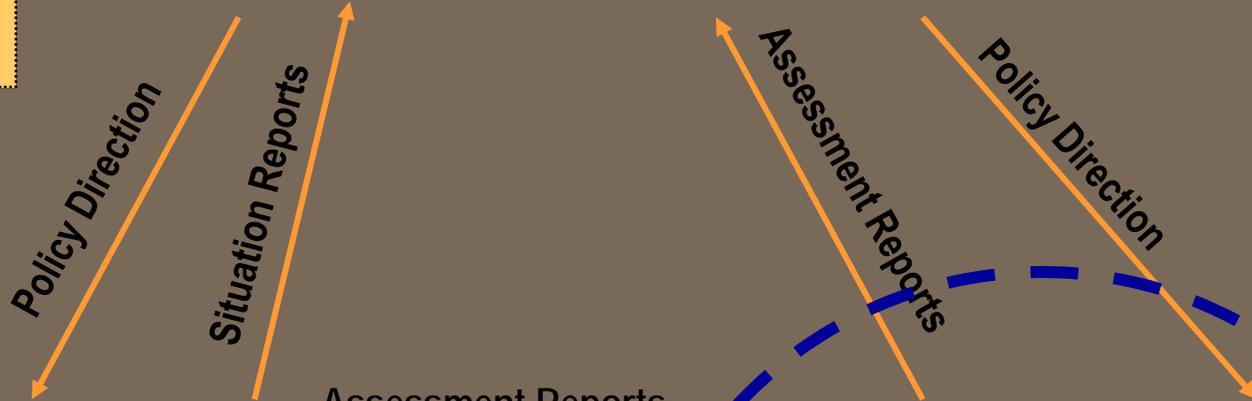
## Essential Drought Plan Components

- **Monitoring** and early warning system
  - assess, communicate, and trigger action
  - foundation of a drought mitigation plan
- **Vulnerability assessment**
  - who and what is at risk and why?
- **Mitigation and response actions**
  - actions/programs that reduce risk and impacts and enhance recovery

**Most processes and plans in the past focused on monitoring and response**

Citizens  
Advisory  
Committee  
(optional)

Drought Task Force



Monitoring  
Committee

Assessment Reports

Risk Assessment  
Committee

Situation Reports

Working  
Groups

Drought Plan  
Organizational  
Structure



## **Drought Task Force Activities**

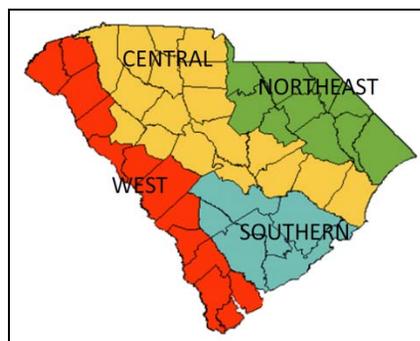
- Supervises/coordinates development of the drought plan
- Coordinates actions, implements mitigation and response programs, and makes policy recommendations before and during drought

### **Drought Planning Tasks**

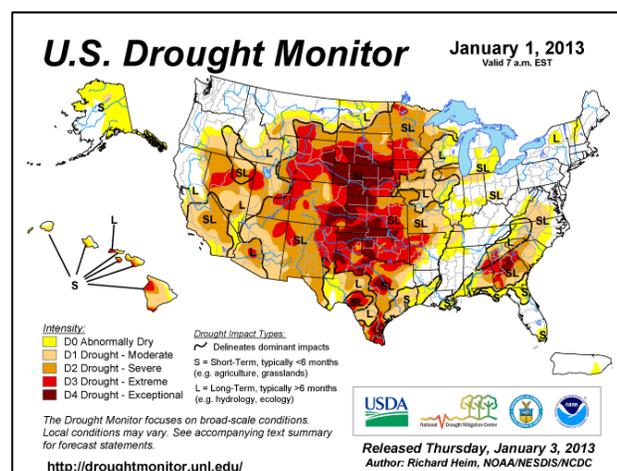
- Assess available resources – what you have to work with?
- Identify short- and long-term objectives of the plan
- Determine scope of the plan (which sectors to include)
- Leadership, committee membership, and roles
- Public involvement?
- Determine planning logistics, time frame and milestones
- Approve and write the plan

# Monitoring and Early Warning Committee

- A. Establish drought management areas
- B. Inventory data quantity and quality from current observation networks
- C. Determine the data needs of primary users
- D. Adopt a workable definition of drought (and stages)
- E. Develop a drought monitoring system
- F. Develop or modify current data and information delivery systems



South Carolina Drought Management Areas



# Risk Assessment Committee

**Task 1: Conduct a Drought Impact Assessment**

**Task 2: Rank the Most Pressing Impacts**

**Task 3: Conduct a Vulnerability Assessment**

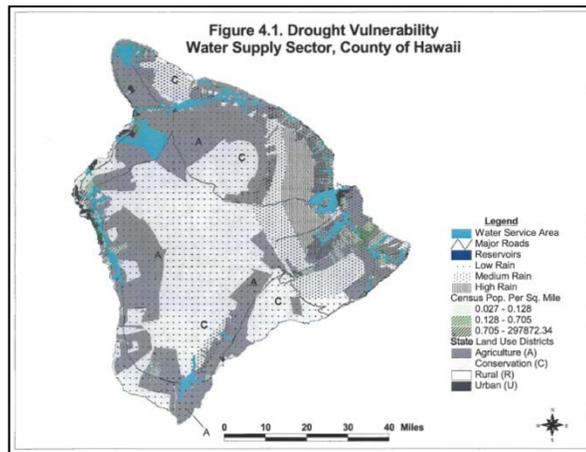
- understand where and why impacts occur?

**Task 4. Identify Risk Management Options**

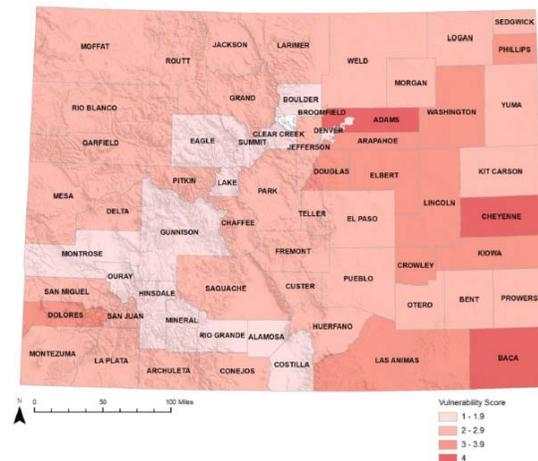
- actions to implement before, during, and after drought

**Task 4. Prioritize Risk Management Options**

- recommended actions based on criteria agreed to



Hawaii Water Supply Sector Vulnerability



Colorado Agricultural Vulnerability



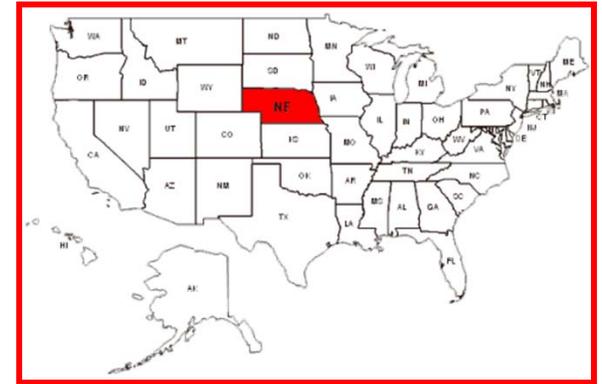
## Writing and Updating the Drought Plan

- ❖ With input from the committees and working groups, the **drought task force will choose the final actions** to be included in the drought plan and, with the assistance of professional writing specialists, **draft the plan.**
- ❖ **Organize public meetings** or hearings at several locations to **explain** purpose, scope, and operational characteristics of the plan, and to **gather final input** from stakeholders before plan becomes final
- ❖ **Distribute and post** on web site through task force
- **Testing of the plan** on recurring basis, or **revision** after drought – a living document

# State Drought Planning: Nebraska

## Economy:

- **Agriculture** (corn, wheat, soybeans, and cattle), **tourism**, **industry**, **energy production**





# Nebraska Drought Planning

- 1986, 1990, **2000** Drought Plans

*Governor mandate: update plan to include mitigation*

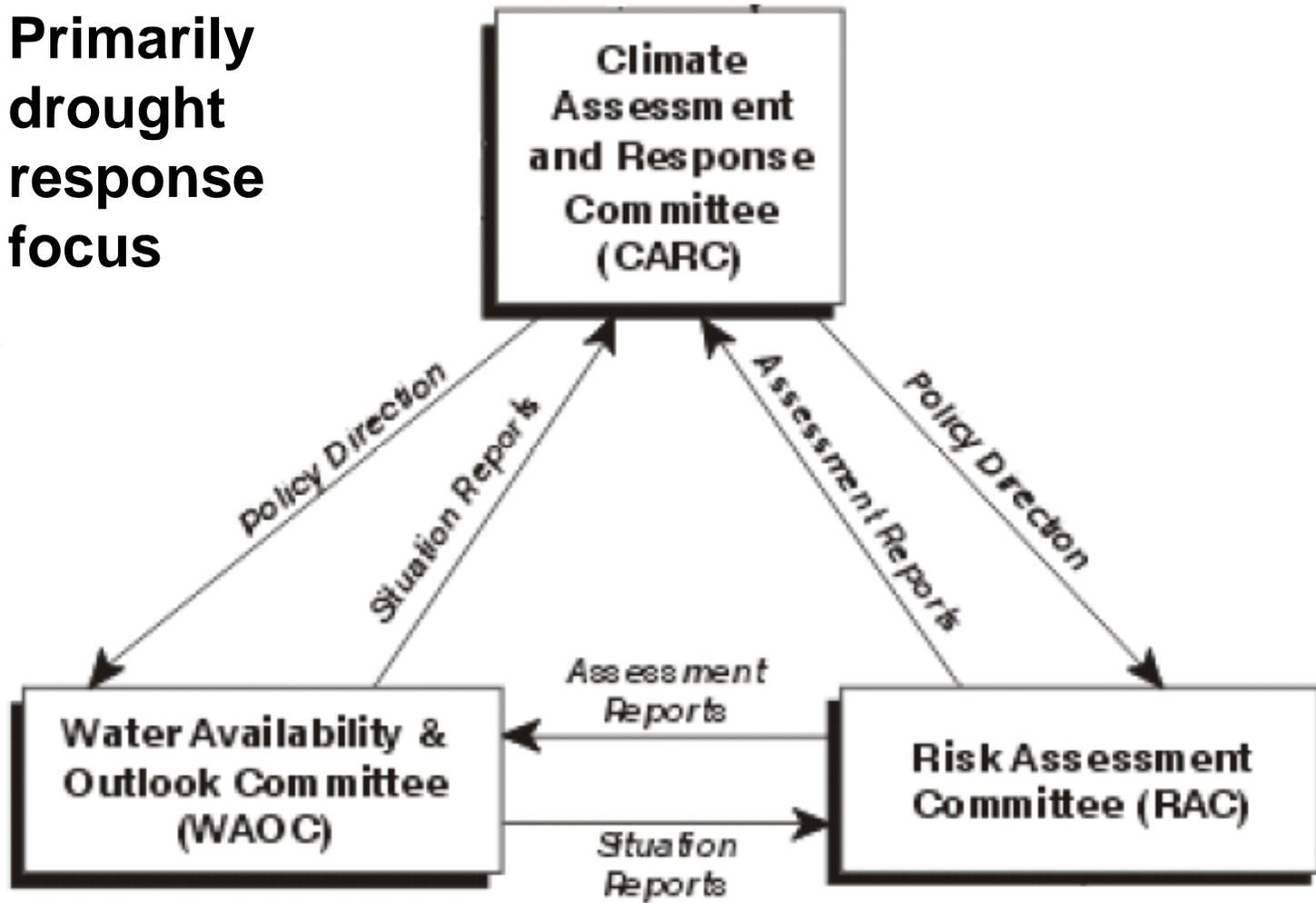
## **NE Climate Assessment and Response Committee:**

- Policy Research Office
- Department of Agriculture
- Department of Natural Resources
- Health and Human Services
- Emergency Management Agency
- University Cooperative Extension Service
- State Conservation and Survey Division
- Nebraska Livestock Producer
- Nebraska Crop Producer
- Others as the Governor deems necessary

***Monitor, Research, and Plan for Climatic Emergencies***



**Primarily  
drought  
response  
focus**



**Monitoring**

**Assess Impacts  
(during drought)**



# **Nebraska Drought Planning Process**

**Public meeting: any interested person/agency**

**Participants: 32 public and private entities**

**Established Subcommittees to assess impacts and identify mitigation and response actions:**

- Agriculture, Natural Resources, and Wildlife
- Municipal Water Supply, Health, and Energy

**Broke up into subcommittees to discuss drought impacts and potential mitigation and response actions**



## Ex) Nebraska Municipal Water Supply, Health, and Energy Subcommittee

### Drought Impact Ranking

1. Municipal water supply shortages
2. Rural water district mechanical problems
3. Private well water quantity and quality problems
4. Excessive irrigation pumping/aquifer conflicts
5. Mental anguish
6. Industrial users drawing down aquifers
7. Health problems from blowing dust
8. Temperature extremes/increased electrical usage



## **Ex) NE Municipal Water, Health, and Energy**

### **Impact:**

- Municipal water supply shortages

### **Potential Actions:**

- develop a list of “problem systems”
- emphasize water conservation
- work with utility companies to distribute information (before and during drought)
- develop programs on the use of wastewater
- emphasize drought mitigation and response plans for communities



# Nebraska's Climate Assessment Response Committee (CARC)

## Drought Mitigation and Response Plan

(Adopted, June 26, 2000)

### Appendix A

**Nebraska Risk Assessment Committee**  
**Nebraska Agricultural, Natural Resources, and Wildlife Subcommittee**  
*Planned Mitigation Actions*

IMPACT	PLANNED ACTIONS	ASSISTANCE AGENCIES
<p>Reduced range and pasture forage and livestock water results in poor animal health, soil erosion, and possible economic loss to ranchers</p>	<p>1. Encourage the use of range and pasture management techniques such as reduced stocking rates, reserve pastures, rotational grazing, removing competitive plants and stored feed to improve sustainability of rangelands under drought conditions.</p>	<p>National Grassland Association, Nebraska Cattlemen, UNL Extension, NRCS, NRDs, Sandhills Cattle Association</p>
	<p>2. Prior to and during drought, use public information programs and on-site visits to emphasize importance of rangeland management and planning to equalize stocking rates with available forage and the need for permanent water storage and distribution systems.</p>	<p>UNL Extension, NRDs, NEDA, DNR, NRCS, NDMC</p>
	<p>3. Monitor forage supplies and conditions around the state and facilitate information exchange between interested parties. A) If conditions warrant, a meeting of a forage advisory committee will be organized early in the spring to determine haystock availability, forage conditions, and wildlife concerns. B) Also, at that meeting, the procedure for emergency roadside haying through the Department of Roads could be discussed to determine need and value of this procedure. C) Also, at that meeting, it could be determined if a letter to the federal office of FSA is warranted to forewarn them of drought conditions and impending requests for CRP emergency release; this group would pass that recommendation on to CARC, who would then pass the request for the letter on to the Governor and the Director of Agriculture.</p>	<p>UNL Extension, NRDs, NEDA, NRCS, DNR, NDMC, FSA, Nebraska Cattlemen, Farm Bureau, Alfalfa Association, Nebraska Department of Roads</p>
	<p>4. Investigate needs of economically stressed ranchers who now rely on federal and state grazing leases to sustain their herds. Develop a coordinated plan of action to be taken by land management agencies to provide grazing and/or supplemental feed assistance to lessees. Investigate changing federal and state grazing regulations during drought.</p>	<p>Nebraska Forest Service, BLM, US Fish and Wildlife, Nature Conservancy</p>
	<p>5. Assist ranchers in obtaining supplemental income by connecting them with employment opportunities, and during drought, by holding job fairs and raising general awareness of job opportunities and ranchers' work skills.</p>	<p>Nebraska Department of Labor, NEDA, UNL Extension, NRDs, Center for Rural Development</p>

**PUBLIC WATER SYSTEM DROUGHT IMPACT REPORT**

September 28, 2012



PWS Name	Restriction Reason	Date of Contact	Water Level Readings in Feet, SWL-Static Water Level, PWL-Pumping Water Level, UNK-Unknown				Restrictions Implemented	Restriction Date/Stage	Year Round Restrictions	County Monthly Average Rainfall Reported in Inches	County Average YTD Rainfall Reported in Inches	Proposed Improvements	
			#	SWL	PWL	UNK							
1 Anselmo (Custer)	Infrastructure	8/9/12		SWL	UNK	PWL	UNK	West side/east side	8/10/12 Voluntary	No	0.13	9.97	Add 2 new wells
2 Ansley (Custer)	Conservation	7/31/12	#1 #2 #3	SWL SWL SWL	22 22 74	PWL PWL PWL	38 38 135	Voluntary reduction	7/23/12 Voluntary	No	0.13	9.97	None at this time
3 Arlington (Washington)	Infrastructure	9/19/12		SWL	UNK	PWL	UNK	Odd/even lawn watering	7/18/12 Voluntary	No	0.79	14.59	None at this time
4 Battle Creek (Madison)	Conservation	9/27/12	#1 #2 #3	SWL SWL SWL	UNK 11 13	PWL PWL PWL	UNK UNK 40	Odd/even lawn watering; no watering from 12 PM to 6 PM	7/16/12 Mandatory	No	0.53	11.53	Develop well field south of town
5 Beaver Lake (Cass)	Water Levels	9/19/12						Odd/even lawn watering, no watering from 12 PM to	Mandatory	No	1.94	16.55	None at this time
6 Bellwood (Butler)	Conservation	8/20/12	#1	SWL	25	PWL	38	East-Tue, Thur, Sat; West-Wed, Fri, Sat; no watering on Monday	Voluntary	No	0.33	14.04	None at this time
7 Bloomfield (Knox)	Water Levels	9/27/12	#6 #75 #2003	SWL SWL SWL	161 169 148	PWL PWL PWL	243 181 204	East/west parts of town alternate days watering	7/11/12 Mandatory	No	0.22	8.35	None at this time
8 Buffalo Co. SID #3 (Buffalo)	Water Levels	8/2/12	#731 #021	SWL SWL	30 30	PWL PWL	50 50	Odd/even watering	7/23/12 Voluntary	No	0.45	8.79	None at this time
9 Burr (Otoe)	Water Levels	8/1/12	#501 #681	SWL SWL	44 23	PWL PWL	UNK 37	No lawn watering	7/23/12 Voluntary	No	2.05	15.43	None at this time
10 Cass Co. RWD #2 (Cass)	Conservation	9/19/12		SWL	71	PWL	137	Odd/even watering; no watering on Monday	8/1/12 Voluntary	No	1.94	16.55	Well update
11 Clarkson (Colfax)	Water Levels	9/27/12	#21 #771 #821	SWL SWL SWL	89 56 94	PWL PWL PWL	96 UNK 138	Odd/even watering; restricted usage from 10 AM to 9 PM	7/11/12 Mandatory	No	0.32	8.5	None at this time
12 Clatonia (Gage)	Water Levels	8/1/12	#351 #671	SWL SWL	145 148	PWL PWL	162 162	Lawn watering every other day	7/24/12 Mandatory	No	1.49	16.97	Encourage irrigators to minimize their operations
13 Cody Land Court (Lincoln)	Conservation	8/1/12						Odd/even watering	Voluntary	No	0.17	7.33	None at this time
14 Cortland (Gage)	Conservation	8/1/12	#751 #811	SWL SWL	160 90	PWL PWL	206 140	Lawn watering every other day	7/27/12 Voluntary	No	1.49	16.97	None at this time

# Water Shortage Emergency Response Plan

For Small Public Drinking Water Systems



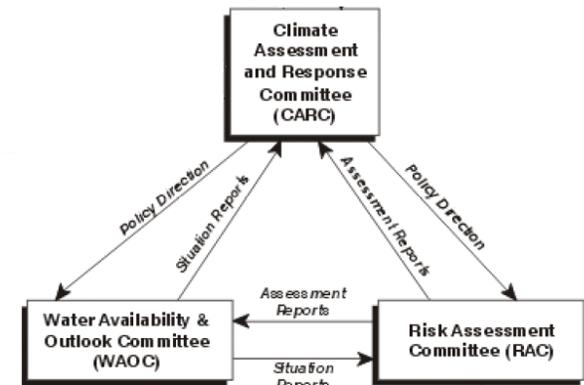
For more information or additional copies of this guidance document, call (402) 471-0088, via e-mail at [scott.sprague@dhhs.ne.gov](mailto:scott.sprague@dhhs.ne.gov) or write to:

Scott Sprague, Capacity Development Coordinator  
DHHS - Division of Public Health  
Drinking Water and Environmental Health  
301 Centennial Mall South  
PO Box 95026  
Lincoln, Nebraska 68509

# Nebraska Drought Monitoring

## Water Availability and Outlook Committee (WAOC)

Nebraska State Climatologist (Chair)  
National Drought Mitigation Center, UNL  
Conservation and Survey Division, UNL  
Cooperative Extension Service, UNL  
Department of Natural Resources, State of Nebraska  
Natural Resources Conservation Service, USDA  
National Weather Service, NOAA  
U.S. Geological Survey, DOI  
Bureau of Reclamation, DOI



## Monitor conditions on regular basis, meet three times per year, and report to CARC during their meetings

- precipitation, temperature, soil moisture, stream flow, groundwater, reservoir and lake levels, and snowpack

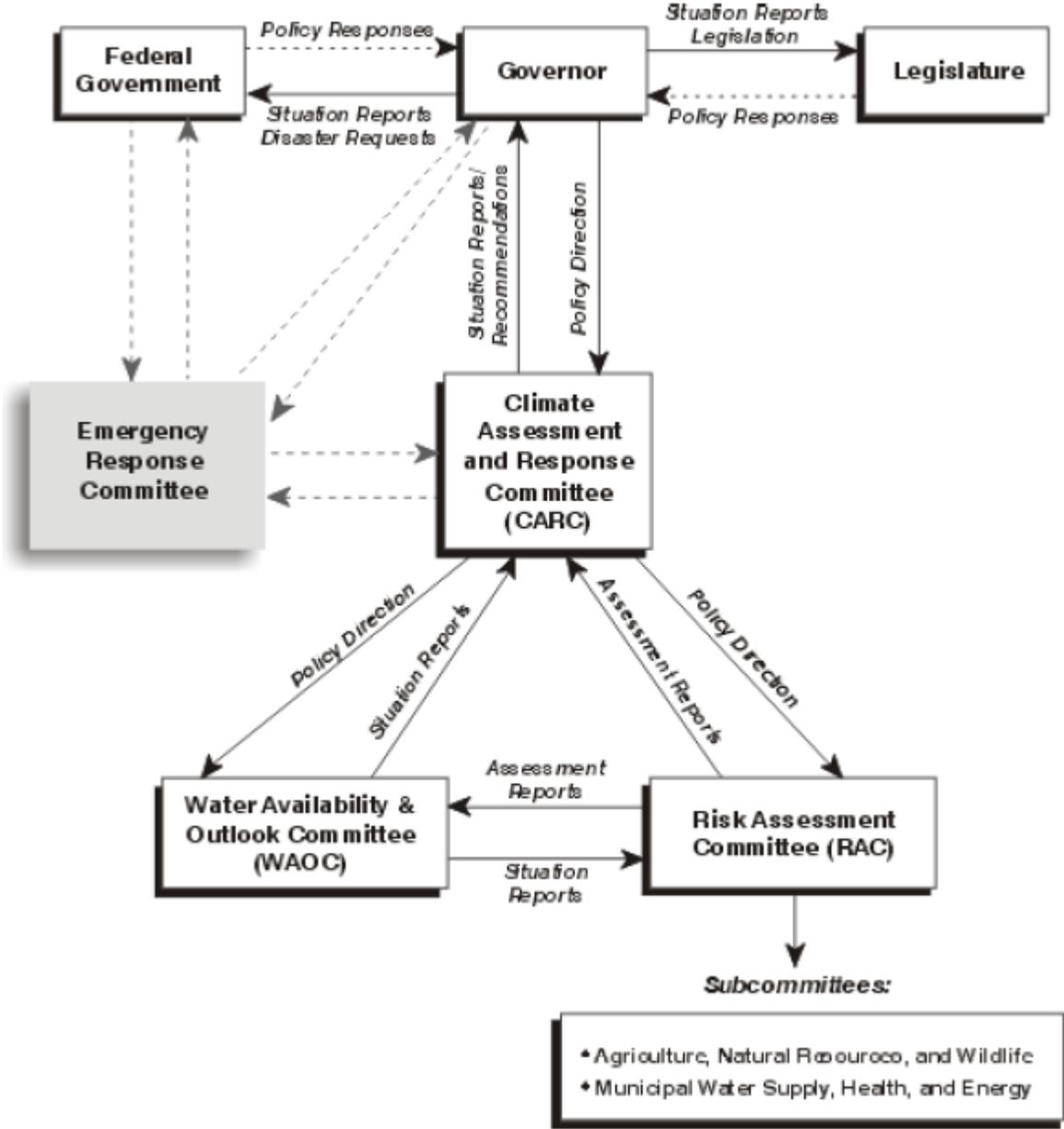


## **The Objectives of the WAOC are:**

1. To work with CARC to define drought for various applications and develop triggers that will initiate and terminate mitigation and response programs and actions;
2. To inventory current observation networks and make recommendations on the expansion or improvement of those networks;
3. To develop a comprehensive monitoring system for drought that incorporates current and emerging technologies to monitor all principal components of the hydrological system;
4. To identify, in collaboration with CARC, drought management areas of the state that reflect various levels of vulnerability to drought conditions; and
5. To recommend potential mitigation and response actions to CARC.

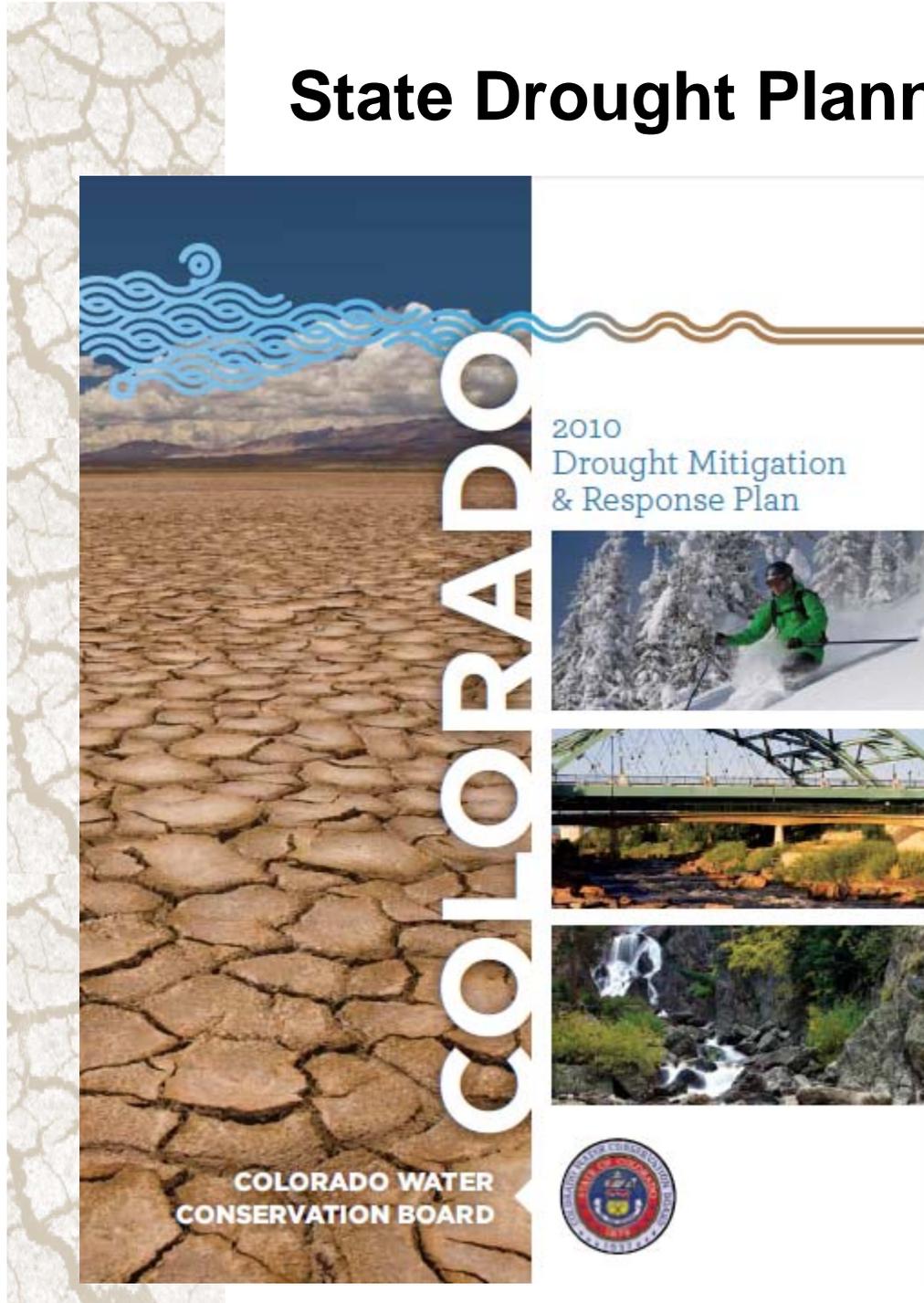
**No specific drought triggers or links to actions; ad-hoc responses**

# Organization of CARC





# State Drought Planning: Colorado



- First developed in 1981
- Revised: 1986, 1990, 2001, 2002, 2007, 2010 (and 2013)

## **Prepared by:**

Colorado Water Conservation Board  
(Department of Natural Resources)  
and AMEC Earth and Environmental

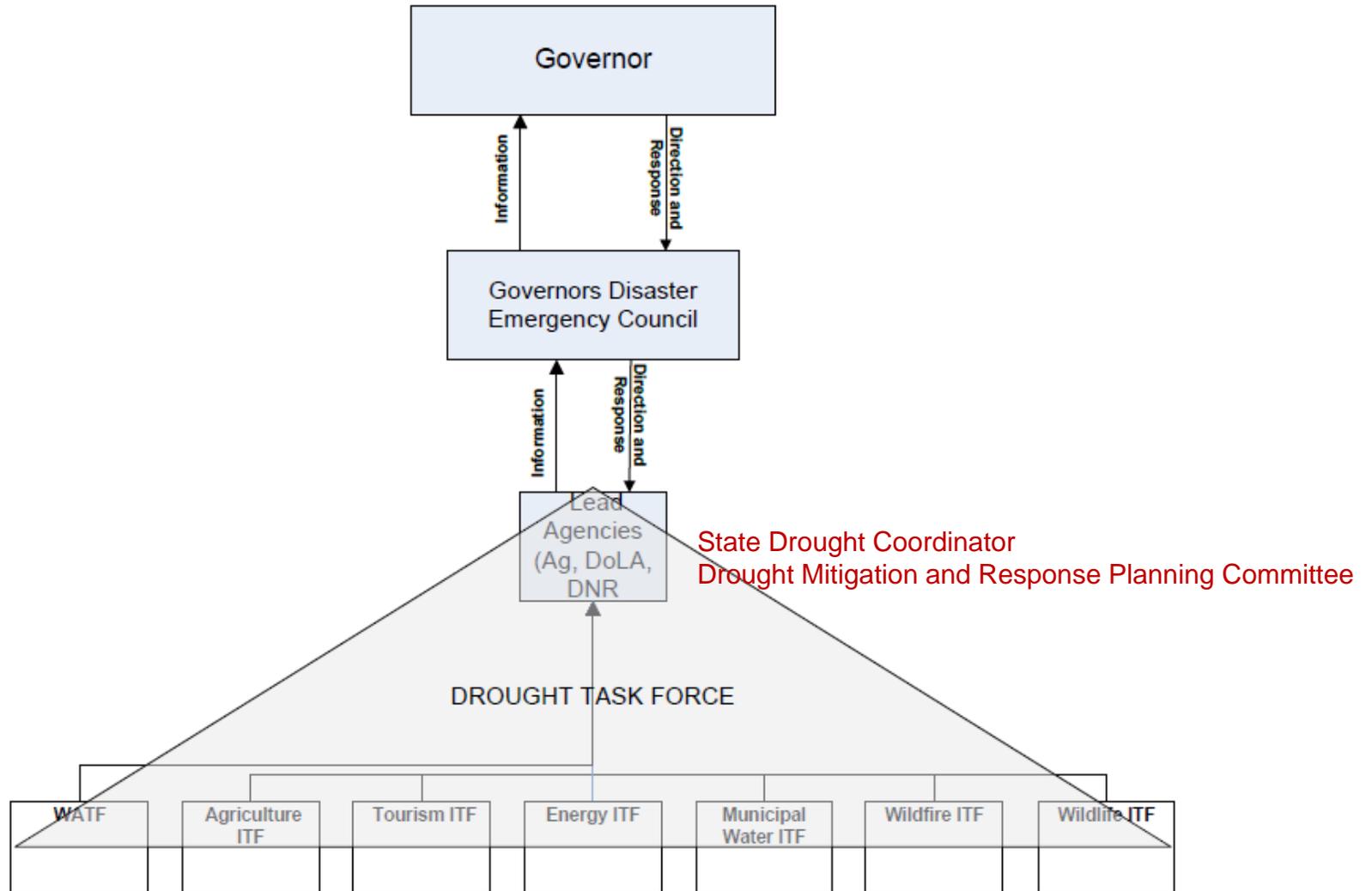
## **Prepared as Drought Annex to:**

Natural Hazard Mitigation Plan and  
State Emergency Operations Plan

## **Complies with:**

Disaster Mitigation Act of 2000  
Emergency Management Accreditation Program  
National Response Framework  
National Incident Management System

# Colorado Drought Task Force Framework





# Colorado Drought Plan Revision Timeline

- **June 2009:** Request for Proposals (RFP) to update drought mitigation plan
- **September 2009:** Award contracts
- **October 2009:** Drought planning promotion
- **December 2009:** DMRPC kick-off meeting
- **February 2010:** 2<sup>nd</sup> DMRPC meeting – review response plan revisions
- **April 2010:** 3<sup>rd</sup> DMRPC meeting – review risk assessment and mitigation strategy
- **May 2010:** Meetings with State Engineer, State Hazard Mitigation Team, WATF
- **May 2010:** Presentation of draft plan to Colorado Water Conservation Board
- **July 2010:** Stakeholder/public review and comment period
- **August 2010:** Web-based meeting with stakeholders
- **September 2010:** Presented to CWCB for final approval

Monthly meetings with CWCB and National Drought Mitigation Center

# Colorado Drought Mitigation and Response Plan

Prepared as Drought Annex to:  
Colorado Natural Hazard Mitigation Plan and Emergency Operations Plan

## Vulnerability Assessment

Figure 17. Agriculture Overall Vulnerability Ranking

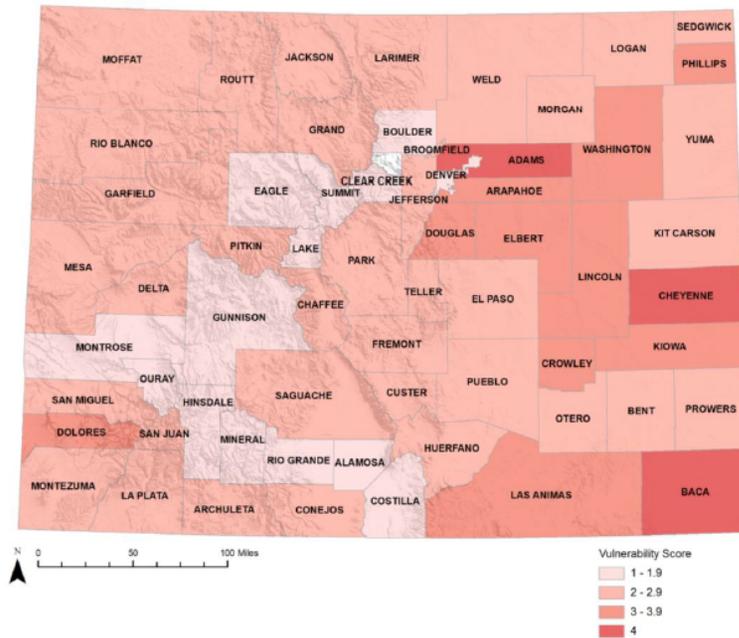


Figure 22. Wildfire Susceptibility Index and Risk by County

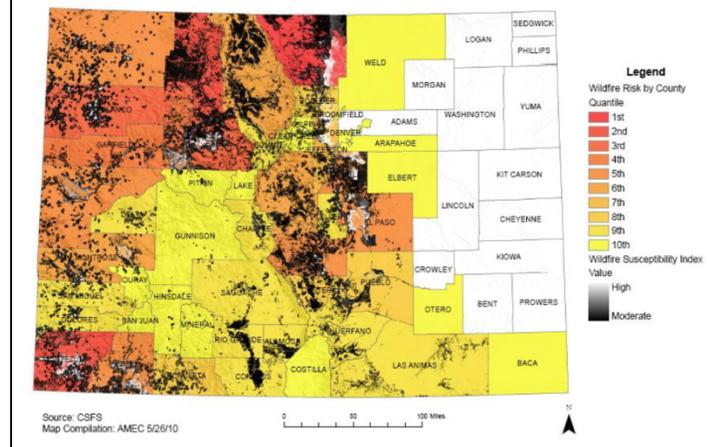
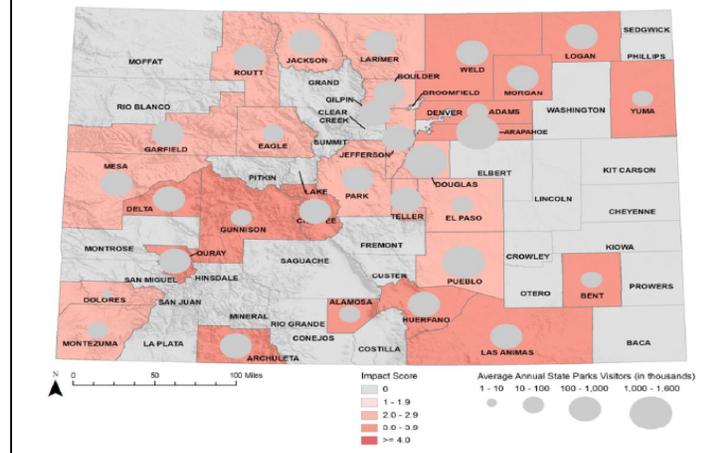


Figure 20. State Assets – State Parks Inventory and Impact Scores



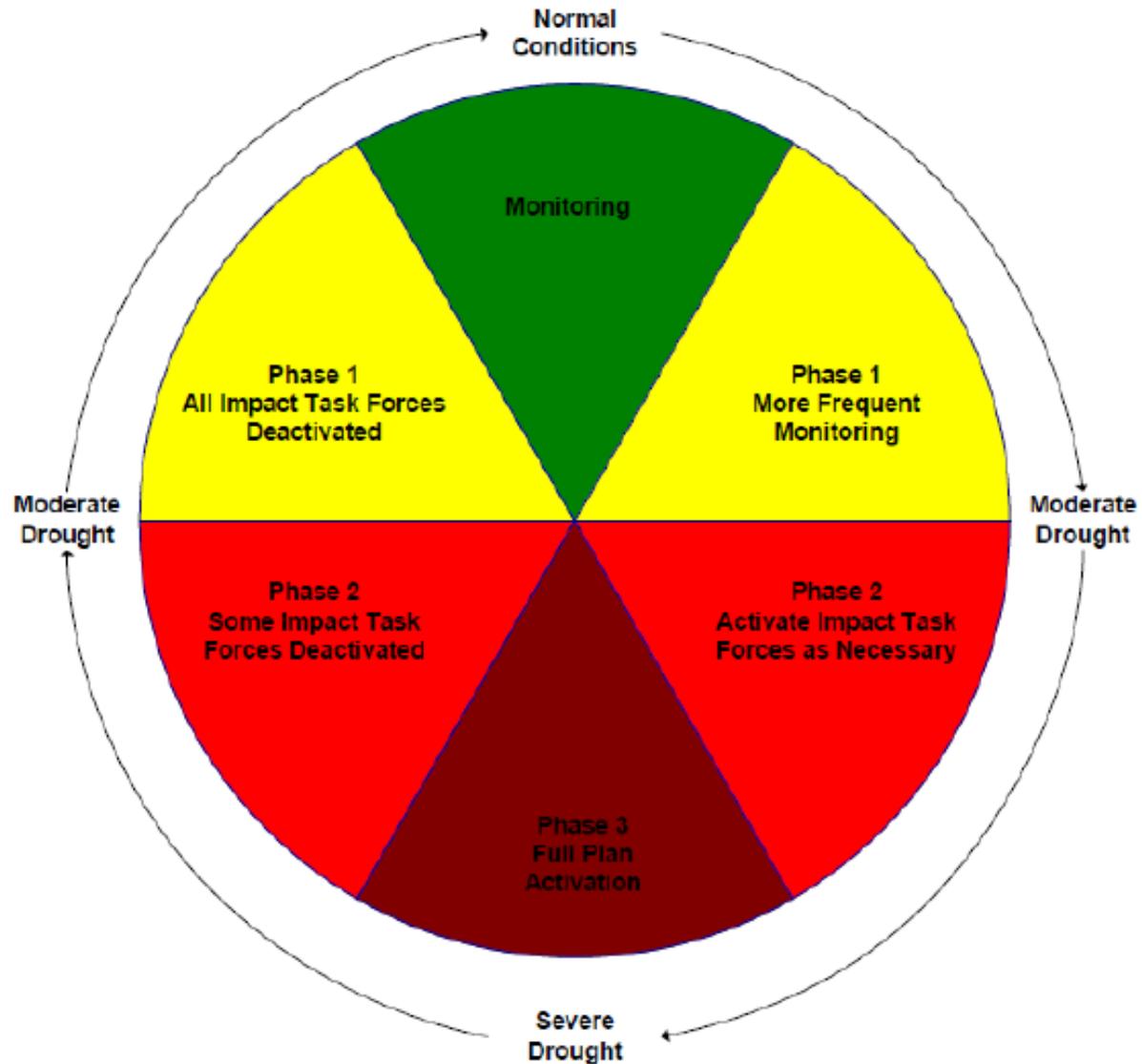
# Colorado Drought Mitigation Goals and Actions

1. Improve Water Availability Monitoring and Drought Impact Assessment
2. Increase Public Awareness and Education
3. Augment Water Supply Through Mechanisms to Transfer Water from Areas of Surplus to Areas of Shortage During a Drought
4. Coordinate and Provide Technical Assistance for State, Local, and Watershed Planning Efforts
5. Reduce Water Demand/Encourage Conservation
6. Reduce Drought Impacts to Colorado's Economy, People, State Assets, and Environment
7. Develop Intergovernmental and Interagency Stakeholder Coordination
8. Evaluate Potential Impacts from Climate Change

Priority	Recommended Action	Primary and Related Goal*	Lead Agency/ Entity	Action Dev. Date	Status 2010		Status, Implementation and Funding Comments
					Completed	Ongoing	
<b>Goal 1: Improve Water Availability Monitoring and Drought Impact Assessment</b>							
H	Integrate state flood and drought monitoring	1	CWCB	2010			<i>Improve efficiency through better integration</i>
H	Collect climatologic data at mid & lower elevations to fill existing gaps in the data collection network	1	WATF NRCS CCC CoCo RAHS CAIC	2010			
H	Additional Drought DSS support and development	1	CWCB SEO	2002		X	<i>Basin Needs DSS will be developed in 2010</i>
M	Funding: stream gage improvements	1	USGS CWCB	2002	2001	X	<i>Instream flow program coordinates with USGS. Funding set aside for program within CWCB</i>
M	Colorado Drought Status strategy	1,2	WATF	2002	2002	X	<i>Monthly drought status update developed for State leadership Some elements of this are being revised with 2010 Plan revision and will continue into the future.</i>
M	Improved Impact Assessment	1	CWCB and ITFs	2010			<i>Impact analysis has always been a weak link. Need multiple impact reporting and data mechanisms &amp; an impact czar. Adapt the tools developed for the 2010 drought vulnerability assessment.</i>
L	Improve soil moisture and monitoring at SNOTEL sites	1	NRCS	2010			<i>Incorporate this data into improved streamflow forecast</i>
L	Vulnerability-weighted drought indexes	1	CWCB CCC NRCS	2010			<i>Tie the vulnerability issues (e.g., sectors, places, and times of year) with drought monitoring indexes to better gauge and weigh the significance of the drought</i>
L	Improve spatial monitoring and analysis of drought, including remote sensing for monitoring of consumptive use	1	NIDIS CCC CWCB	2010			<i>Add spatially-explicit water demand, identified by sector, to water rights database -Refer to NCAR effort for NIDIS pilot Identify and establish core geospatial data layers as well as data stewards to help track situations Link crop remote sensing with WaterSMART activities.</i>

# Colorado Drought Plan Implementation

Appendix to Drought Hazard Mitigation Plan



## Drought Response Plan Summary Action Table

Severity Indicators and Impacts (Colorado Modified Palmer Drought Index (CMPDI) or SWSI, SPI, and U.S. Drought Monitor)	Drought Phase and Response Summary	Actions to be Considered
<p>-1 to positive indices in all river basins or modified Palmer climate division</p> <p>-0.5 to positive SPI (six month)</p> <p>D0 Abnormally Dry</p> <p>D0 ranges:            CMPDI or SWSI: -1.0 to -1.9            SPI: -0.5 to -0.7            Indicator blend Percentile: 21-30</p> <p>Impacts: short-term dryness slowing planting, growth of crops or pastures.</p>	<p>Normal Conditions Regular Monitoring</p>	<ul style="list-style-type: none"> <li>• CWCB/WATF monitors situation on monthly basis, discusses trends with National Weather Service (NWS), State Climatologist, State Engineer, Natural Resource Conservation Service (NRCS), and others as appropriate.</li> <li>• Data reviewed for drought emergence and summarized in Governor's Drought Situation Report.</li> <li>• Implement long-term mitigation actions identified in drought mitigation plan</li> <li>• ITF chairs meet twice yearly to monitor progress on long-term drought mitigation and review any lessons from previous drought periods, and review the response plan.</li> </ul>
<p>-1.0 to -2.0 in any river basin or modified Palmer climate division</p> <p>-0.6 to -1.0 SPI (six month)</p> <p>D1 Moderate Drought</p> <p>D1 ranges:            CMPDI or SWSI: -2.0 to -2.9            SPI: -0.8 to -1.2            Indicator blend Percentile: 11-20</p> <p>Impacts: Some damage to crops, pastures; streams, reservoirs, or wells low, some water shortages developing or imminent; voluntary water-use restrictions requested</p>	<p><b>Phase 1</b>            More close monitoring of conditions for persisting or rapidly worsening drought;            Official drought not yet declared</p>	<ul style="list-style-type: none"> <li>• ITF chairs alerted of potential for activation, monitoring of potential impacts.</li> <li>• Assess need for formal ITF and DTF activation depending on timing, location, or extent of drought conditions, existing water supply, and recommendation of WATF; DTF is comprised of WATF, ITF chairs, and Lead Agencies.</li> <li>• DTF Lead Agencies (CDA/DOLA/DNR) notified of need for potential activation.</li> </ul>

# State Agency Roles During Drought Emergencies

Responsibility									
Agency	Specialization	Track Impacts Related to Water Shortages	Improve Water Availability Monitoring	Increase Public Awareness and Education	Augment Water Supply	Facilitate Watershed and Local Planning	Reduce Water Demand/ Encourage Water Conservation	Support Programs to Reduce Impact	Provide Other Technical Support
Department of Agriculture	Support to Agriculture and Agribusiness	X		X		X	X	X	X
Department of Local Affairs	Support to Municipal Water Systems	X		X	X	X	X		X
Department of Military Affairs	Resources Support								X
Department of Natural Resources	Wildlife, Water Administration, Drought and Water Planning	X	X	X	X	X	X	X	X
Department of Public Health and Environment	Public Health and Water Quality	X		X					X
Office of Economic Development and International Trade	Tourism	X		X					X
Division of Emergency Management	Life Threatening Situations and Federal Disasters	X	X	X		X			X
Governor's Energy Office	Energy	X		X					X
Office of State Planning/Budget	Economic Impacts	X		X					
State Forest Service	Wildfires	X		X					X

**No one way to develop a plan.**

**Must decide what works best for South Dakota.**

Home Login

## Welcome to the National Drought Mitigation Center

### Quick Links

- [U.S. Department of Agriculture Disaster and Drought Assistance page](#)
- [Current info via the Drought Impact Reporter RSS feed](#)
- [Drought Headlines](#)

### States' drought resources

- [Recently updated drought pages](#)
  - For example: [Nebraska Drought Resources](#) from UNL Extension
  - [Comprehensive list of resources, by state, via a drill-down map](#)

### UNL's Drone Journalism Lab reports on Nebraska's Drought of 2012

Share More info

### Pause Slideshow

Overview

Drought is a normal part of climate...it will happen again. Fortunately, there are things you can do before, during, and after drought to reduce your risk. Ranchers are increasingly implementing new ways to better prepare for and respond to drought.

The information, strategies and resources on this site are designed to provide livestock producers in the **Great Plains region** with information on how to incorporate management strategies to reduce the threat drought poses to livestock and forage operations.

### Managing Drought Risk on the Ranch: Great Plains Examples

South Dakota	Nebraska	Kansas	Colorado
 Davbreak Ranch (Central)	 Tipsets-Myers Ranch (Western Sandhills) Reed Hamilton Ranch (Sandhills) Shamrock Ranch (Southwestern)	 Alexander Ranch (South Central) Adams Ranch (North Central)	 Welch Ranch (Southern)
			 Johnson Ranch (West Central)

### Managing Drought Risk on the Ranch

Managing Drought Risk on the Ranch offers a comprehensive set of options for reducing risk before, during and after drought.

More information available at the NDMC website at:

<http://drought.unl.edu>

Dr. Cody Knutson  
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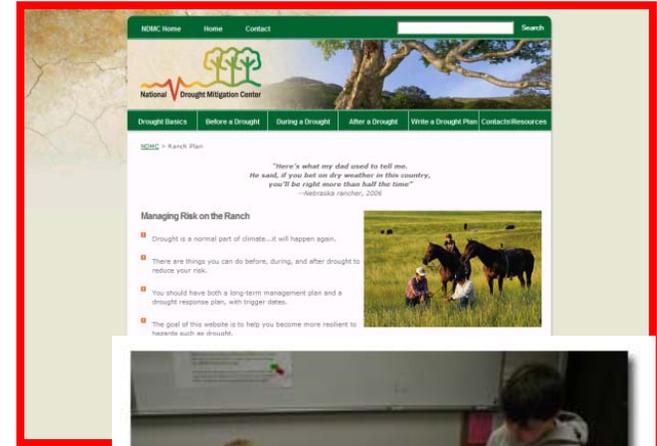
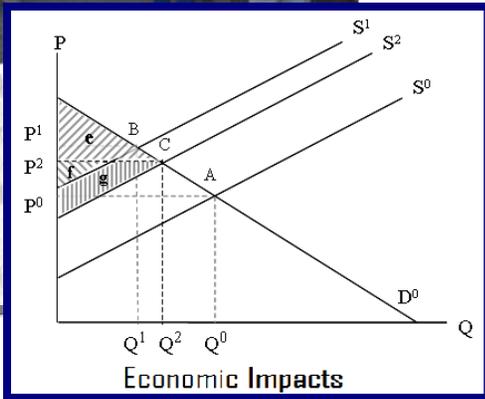
**Thank You!**

# NDMC's Planning and Social Science Program Area



**Cody Knutson**

**Activities**



**Stakeholders  
Guides  
Planning  
Education**

**How to Reduce Drought Risk**

Preparations and Mitigation Working Group  
March 1998

Principal Author:  
Cody Knutson,  
National Drought Mitigation Center

Mike Hawn,  
National Drought Mitigation Center

Tom Phillips,  
U.S. Bureau of Reclamation

**Republican River Basin Water and Drought Portal**

Welcome to the Republican River Basin Water and Drought Portal

Water resources in the Republican River Basin are vital to the sustainability of the life that surrounds them. Not only is it important to the well being of people but it's also necessary for crop production, animal life, and the hydrological cycle. This portal was created to provide comprehensive information on emerging and ongoing water and drought issues for anyone that has an interest in the Republican River Basin. It will also give stakeholders the information and tools needed to enhance the basin's drought and water shortage preparedness.

The links listed to the left lead to information about past, current, and potential water and drought conditions. You will also find sections on actions that can be taken to foster effective water and drought management, educational tools, research that has been done in the basin, and legislative information.

The portal is part of the National Integrated Drought Information System (NIDIS), which is a national effort to provide enhanced access to drought-related information. The National Drought Policy Commission was established under the National Drought Policy Act of 1998 to ensure collaboration between different government agencies on drought-related issues. The Commission issued a report titled *Preparing for Drought in the 21st Century* in 2006. Following the Commission's recommendations, the National Integrated Drought Information System (NIDIS) was envisioned in the Western Governors' Association Report in 2004. The NIDIS Act was introduced in the U.S. Congress and signed by the President in 2006. To learn more about NIDIS, see the national website at <http://www.drought.gov>.

**What's New**

Listening Sessions getting set for Wray, Coby, and McCook...

We will continue to add content to this website. Please visit us often to find news and updated information. Your feedback is important to us. Please send comments to [cknutson@ndmc.edu](mailto:cknutson@ndmc.edu).

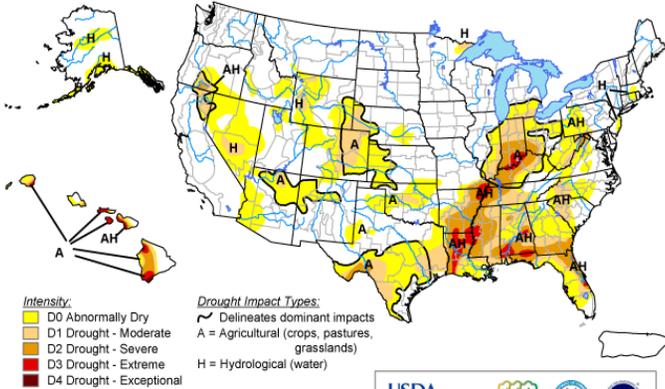
**Recent Drought News**

"National Drought Mitigation Center and NDMC to host listening sessions May 27-29" [APAC \(2-20-2009\)](#)  
[View full announcement](#)

"Nebraska court battle over Republican River tax set to begin" - U.S. Water News (2-12-2009)  
[View article](#)

# NDMC's Monitoring Program Area

**U.S. Drought Monitor** November 2, 2010  
Valid 8 a.m. EDT



The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

<http://drought.unl.edu/dm>



Released Thursday, November 4, 2010  
Author: Mark Svoboda, National Drought Mitigation Center

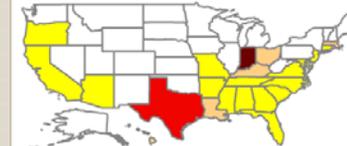
**Mark Svoboda**

**Monitoring**

**Activities**

**Drought Impact Reporter**  
National Drought Mitigation Center

[View Drought Impacts](#) | [Add A Drought Impact](#) | [Time-Lapse Animation](#) | [About](#) | [Help](#) | [User Login](#)



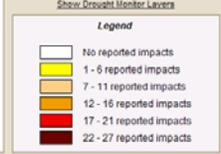
**Map Options**

**Impact Categories:**

- Agriculture
- Water/Energy
- Environment
- Fire
- Social
- Other

Source:

Time Period:



Instructions: Click on a state to see the reported drought impacts that affect that state.

**North American Drought Monitor**

March 31, 2009

Released: Thursday, April 16, 2009

<http://www.ncdc.noaa.gov/nadm.html>

**Intensity:**

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

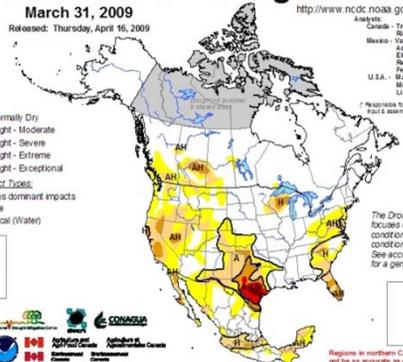
**Drought Impact Types:**

- Delineates dominant impacts
- A = Agriculture
- H = Hydrological (Water)

**D1A**  
**D3A**  
**D4A**



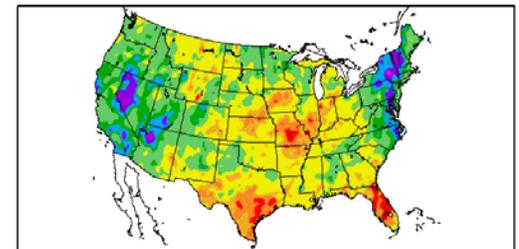
Regions in northern Canada may not be as accurate as other regions due to limited information.



The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text for a general summary.

**USDM**  
**NADM**  
**DIR**  
**NIDIS**  
**Atlas**

Monthly SPI  
10/1/2010 - 10/31/2010



Generated 11/2/2010 at HPRCC using provisional data.

Regional Climate Centers

# Must understand drought impacts

## - symptoms of underlying vulnerabilities

### Economic Category

- Agricultural
- Industry
- Tourism and Recreation
- Energy
- Financial
- Transportation

### Environmental Category

- Animal/Plant
- Wetland
- Water Quality

### Social Category

- Stress and Health
- Nutrition
- Recreation
- Public Safety
- Cultural Values
- Aesthetic Values



# Impact Assessment Subcommittees



Ex) 1

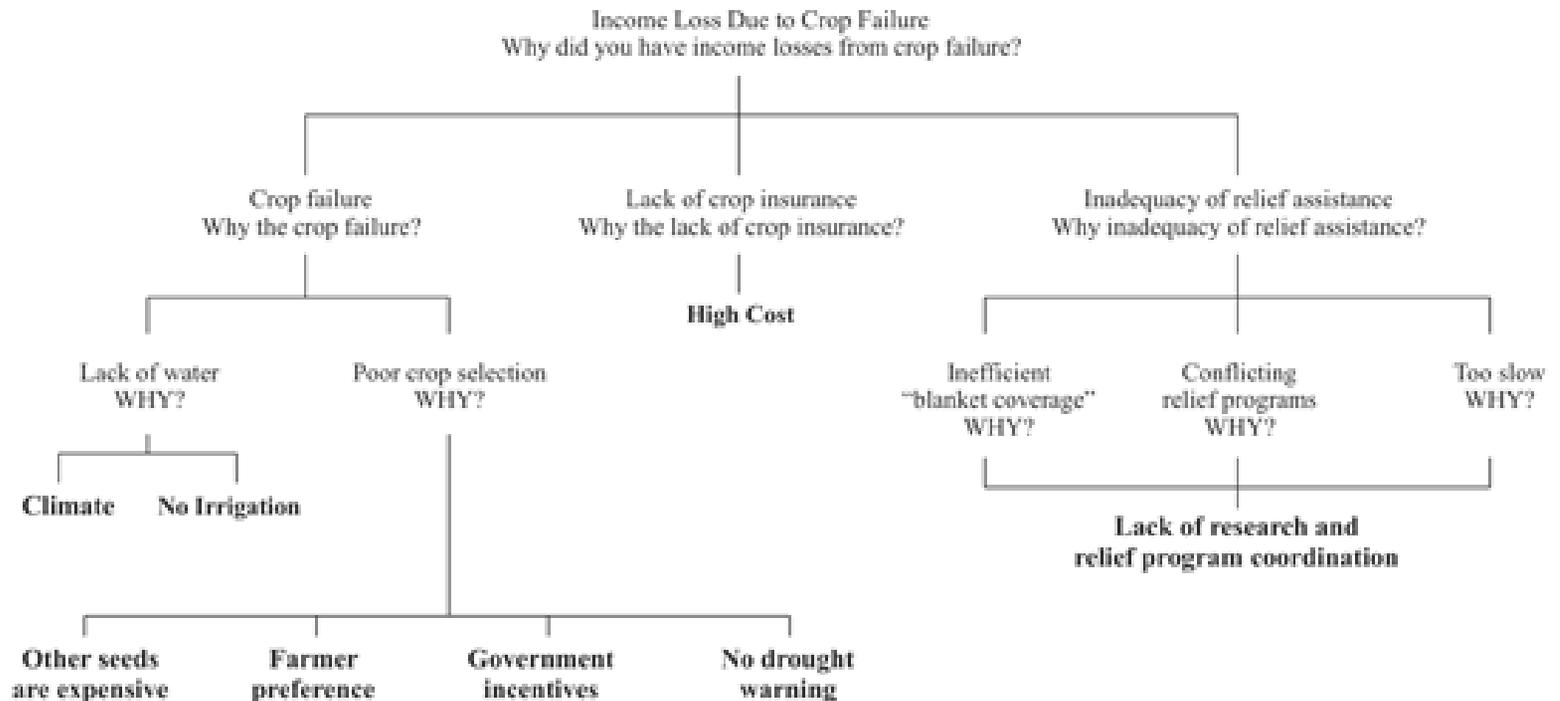
- Agriculture, Natural Resources, and Wildlife
- Municipal Water Supply, Health, and Energy

Ex) 2

- Agriculture
- Drinking Water, Health, and Energy
- Wildlife and Wildfire
- Tourism and Economic Impact

# Vulnerability Analysis Methods

- discussions, tree diagrams, scenario building, modeling, quantitative indicators



# Identify Risk Reduction Measures

## Drought Mitigation

- long-term water demand reduction
- long-term water supply increase
- Best land management practices
- Flexible, diversified systems
- Stable financial systems

## Drought Preparedness

- creating monitoring and early warning systems
- developing drought plans

## Drought Response/Recovery

- short-term water demand reduction
- short-term water supply increase
- short-term management adjustments
- enhanced relief management
- rehabilitation



# Drought Mitigation Options in Water Management



## Water Demand Reduction

Public information campaigns, permanent water restrictions, economic incentives, more efficient technologies, alternative crops, non-irrigated crops, dual distribution networks, water recycling

## Water Supply Increase

Control seepage, reduce evaporation losses, water transfers, reuse of water, new or expanded reservoirs, new or deeper wells, small catchment ponds, desalination, water quality improvement

## Modified Water Governance

Water banking, reservoir release modification, coordination between systems, water right modifications, conjunctive use systems

# Determining Appropriate Options

Impact of Drought	Underlying Causes of Vulnerability (Basal Causes of the Why Questions)	Possible Actions	Mitigation (M), Response (R), or Accepted Risk (AR)	Feasible?	Effective for impact reduction?	Benefit / Cost ?	Equitable?	To Do?
Income loss from crop failure	Variable climate	Weather modification	M					
		Weather monitoring	M					
	No irrigation	Haul water during a drought	R					
		Provide government assistance for projects	M					
	Expensive seeds	Subsidize seed sales	M					
	Farmer preferences to plant specific seeds	Conduct workshops	M					
		Conduct research	M					
		Enhance communication	M					
	Government incentives to plant specific crops	Lobby for new incentives	M					
	No drought warning	Provide weather monitoring	M					
		Identify "triggers"	M					
	High cost of crop insurance	Government subsidies	R					
	Lack of research as to the efficiency of drought relief efforts	Identify target groups and conflicting relief program criteria and goals	M					
	Lack of drought relief program coordination	Streamline relief application and funding	M					